CLAIMS

1. Process for radiomobile communication of the time division multiple access type, in which timeslots are allocated to several users for transmission and reception of radioelectric signals, and in which:

- on transmission, data symbols and reference symbols are created in each allocated timeslot, a radioelectric signal containing these data symbols and reference symbols is transmitted, this signal being sent along a multi-path radiomobile channel,
- on reception, matched filtering is applied to the received signal, the filtered signal is sampled at the rate of the symbols, an estimate of the radiomobile channel is made, the samples are processed using this channel estimate and data symbols specific to the allocated timeslot are restored,

this process being characterized in that:

- on transmission, several reference sequences possessing appropriate time correlation properties are built up for each allocated timeslot, and these sequences are distributed in each timeslot,
- on reception:
  i) in order to estimate the radiomobile channel, this channel is represented by a mesh comprising branches symbolizing transitions between two successive states of

the channel and characterizing possible sequences at the channel output,

ii) the probabilities of these branches are calculated using an iterative algorithm in which an estimate of a representation $\{G^{l(D)}\}_{l=0}^{L-l}$ of L paths of this channel is calculated using a finite number (D+1) of iterations using the maximum a posteriori probability criterion, the iteration rank (d+1) ($\Im$d+1) being used to obtain a re-estimate $\{G^{l(d+1)}\}_{l=0}^{L-l}$ starting from the estimate $\{G^{l(d)}\}_{l=0}^{L-l}$ obtained in the previous iteration ($\Im$d), and in each iteration ($\Im$d+1), the vectors $\{G^{l(d+1)}\}$ l=0, 1, ..., L-1 are calculated in L steps from vectors $\{G^{m(d+1)}\}_{m=0}^{l-l}$ and $\{G^{m(d)}\}_{m=l}^{L-l}$ calculated in the previous step, the estimate $\{C^{l(D)}\}_{l=0}^{L-l}$ of L channel paths finally being obtained from the estimate of its representation $\{G^{l(D)}\}_{l=0}^{L-l}$.

2. Process according to claim 1, in which the following are used in sequence in each step of each iteration:

i) a BAHL algorithm or one of its variants to produce conditional probabilities starting from the $d^{th}$ re-estimate of the last L-*l* paths and the $(d+1)^{th}$ re-estimate of the first *l* paths,

ii) a SAGE algorithm to output a $(d+1)^{th}$ re-estimate of the $l^{th}$ path.

3. Process according to claim 1 in which, after having obtained an estimate of the discrete channel $\{C^{l(D)}\}_{l=0}^{L-1}$ and taking account of samples received during the processed timeslot, a decision is made about the sequence of transmitted symbols using a BAHL optimal algorithm or one of its variants to obtain the a posteriori probability for each transmitted symbol.

4. Process according to claim 1, in which K reference sequences are distributed in each allocated timeslot, where K is between 2 and 12 inclusive.

5. Process according to claim 1, in which each sequence comprises a number of reference symbols less than 8.

6. Process according to any one of claims 1 to 5, in which the reference sequences have a zero circular autocorrelation function everywhere except at the origin.

7. Process according to claim 6, in which a reference sequence {-1, +1, +1, +1} (or a sequence derived from this reference sequence by circular swapping) is used, or a sign change for a number of paths (L) less than or equal to 4.

8. Process according to claim 6, in which a reference sequence {1,i}, or a sequence derived from this reference sequence is used by circular swapping, conjugation or sign change, is used for a number of paths (L) less than or equal to 2.

FIGURE 1

FIGURE 2

10 Source

12 Coder/interlacer

14 Modulator

20 Multi-path channel

32 Discrete channel estimator

30 Demodulator (matched filter/whitener filter)

38 Addressee

36 De-interlacer/decoder

34 Equalizer

FIGURE 8a

91 Modulator

92 Multi-path channel

Demodulator

94 Matched filter

95 Whitener filter

FIGURE 9

Reference sequence

CAZAC sequence